

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS
WASHINGTON

(Revised to May 5, 1937)

CEMENT: TECHNICAL PUBLICATIONS BY MEMBERS OF
THE STAFF OF THE NATIONAL BUREAU OF STANDARDS

This letter circular gives a list of publications on CEMENT by members of the staff of the National Bureau of Standards. Some of these publications were printed in the regular series of the Bureau and others in various scientific, technical and trade association journals.

For ready reference and convenience in ordering the separate papers of the Bureau, these have been listed with the serial letter and number in one column, and the price in the second column. The publications for which prices are indicated may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D.C. The prices quoted are for delivery to addresses in the United States and its possessions, and to Canada, Cuba, Mexico, Newfoundland, the Philippines, and the Republic of Panama. When remitting for delivery to other countries than those, include in your remittance one-third of the total cost of the publications to cover postage. Remittances should be made payable to the Superintendent of Documents, Government Printing Office, Washington, D.C., and sent to him with the order. "O.P." in the column marked "Price" indicates that the publication is out of print, but may be consulted at most large libraries. A complete list of the Bureau's publications (Circular C24 and Supplement) is also generally available at such libraries.

Serial letters are used to designate BUREAU publications:

- T = "Technologic Paper" of the National Bureau of Standards.
T1 to T202 were issued each independent of the other with individual pagination. Later they were assembled to make the first 15 volumes of this series, and subsequent separates were given volume pagination (Tech. Pap. BS). This series was superseded by the "Bureau of Standards Journal of Research" in 1928.
- RP = "Research Papers." These are reprints of articles appearing in the "Bureau of Standards Journal of Research" (BS J. Research) and the "Journal of Research of the National Bureau of Standards" (J. Research NBS), the latter being the title of this periodical since July 1934 (volume 13, number 1).

C = "Circular" of the National Bureau of Standards.

LC= "Letter Circular" of the National Bureau of Standards.

TECHNOLOGIC PAPERS

<u>Series</u>	<u>Price</u>	
T3	O.P.	Tests of the absorptive and permeable properties of portland cement mortars and concretes, together with tests of dampproofing and waterproofing compounds and materials. R.J. Wig and P.H. Bates. Tech. Pap. BS, T3 <u>1</u> , (1910-12).
T5	O.P.	The effect of high-pressure steam on the crushing strength of portland cement and concrete. R.J. Wig. Tech. Pap. BS, T5, <u>1</u> , (1910-12).
T12	O.P.	Action of the salts in alkali water and sea water on cement. P.H. Bates, A.J. Phillips and R.J. Wig. Tech. Pap. BS, T12, <u>2</u> , (1912-14).
T29	O.P.	Variation in results of sieving with standard cement sieves. R.J. Wig and J.C. Pearson. Tech. Pap. BS, T29, <u>3</u> , (1911-16).
T42	10¢	Standardization of No. 200 cement sieves. R.J. Wig and J.C. Pearson. Tech. Pap. BS, T42, <u>4</u> , (1913-14).
T43	O.P.	Hydration of portland cement. A.A. Klein and A.J. Phillips. Tech. Pap. BS, T43, <u>5</u> , (1914-15).
T47	O.P.	Value of the high pressure steam tests of portland cement. R.J. Wig and H.A. Davis. Tech. Pap. BS, T47, <u>5</u> , (1914-15).
T48	O.P.	An air analyzer for determining the fineness of cement. J.C. Pearson and W.H. Sligh. Tech. Pap. BS, T48, <u>5</u> , (1914-15).
T78	O.P.	Properties of the calcium silicates and calcium aluminate occurring in normal portland cement. P.H. Bates and A.A. Klein. Tech. Pap. BS, T78, <u>8</u> , (1916-17).

TECHNOLOGIC PAPERS (Cont'd)

<u>Series</u>	<u>Price</u>	
T102	15¢	The properties of portland cement having a high magnesia content. P.H. Bates. Tech. Pap. BS, T102, <u>9</u> , (1916-17).
T174	O.P.	Effect of calcium as an accelerator of the hardening of portland cement mixtures. R.N. Young. Tech. Pap. BS, T174, <u>14</u> , (1920-21)
T197	O.P.	Cementing qualities of the calcium aluminates. P.H. Bates. Tech. Pap. BS, T197, <u>15</u> , (1921).
T239	10¢	Tests of caustic magnesia made from magnesite from several sources. P.H. Bates, R.N. Young and P. Rapp. Tech. Pap. BS, T239, <u>17</u> , 529(1922-24).

RESEARCH PAPERS

RP34	O.P.	Reaction of water on calcium aluminates. L.S. Wells. BS J. Research <u>1</u> , 951(1928).
RP54	10¢	The sulphoaluminates of calcium. W. Lerch, F.W. Ashton and R.H. Bogue. BS J. Research <u>2</u> , 715(1929).
RP132	10¢	Influence of magnesia, ferric oxide, and soda upon the temperature of liquid formation in certain portland cement mixtures. W.C.Hansen. BS J. Research <u>4</u> , 55(1930).
RP233	10¢	The X-ray method applied to a study of the constitution of portland cement. L.T.Brownmiller and R.H. Bogue. BS J. Research <u>5</u> , 813(1930).
RP265	5¢	Determination of magnesium in portland cement and similar materials by the use of 8-hydroxyquinoline. J.C. Redmond and H.A.Bright. BS J. Research <u>6</u> , 113(1931).
RP381	5¢	The decomposition of tricalcium silicate in the temperature range, 1,000-1,300°C. E.T.Carlson. BS J. Research <u>7</u> , 893(1931).
RP414	5¢	The system $\text{CaO-Na}_2\text{O-Al}_2\text{O}_3$. L.T. Brownmiller and R.H.Bogue. BS J. Research <u>8</u> , 289(1932).
RP510	5¢	The system: $\text{CaO-B}_2\text{O}_3$. E.T. Carlson. BS J. Research <u>9</u> , 825(1932).

RESEARCH PAPERS (Cont'd.)

<u>Series</u>	<u>Price</u>	
RP569	5¢	The precipitation and titration of magnesium oxyquinolate in the presence of calcium oxalate, and its application in the analysis of portland cement and similar silicates. J.C. Redmond. BS J. Research <u>10</u> , 823(1933).
RP584	5¢	The activity coefficients of hydroxyl ion in solutions of calcium hydroxide at 30°C. E.P. Flint and L.S. Wells. BS J. Research <u>11</u> , 163 (1933).
RP684	5¢	Heat of hydration of portland cement pastes. W. Lerch and R.H. Bogue. J. Research NBS <u>12</u> , 645(1934).
RP687	5¢	Study of the system $\text{CaO-SiO}_2\text{-H}_2\text{O}$ at 30°C and the reaction of water on the anhydrous calcium silicates. E.P. Flint and L.S. Wells. J. Research NBS <u>12</u> , 751(1934).
RP746	5¢	Investigation of commercial masonry cements. J.S. Rogers and R.L. Blaine. J. Research NBS <u>13</u> , 811(1934).
RP777	5¢	Effect of granulometric composition of cement on the properties of pastes, mortars, and concretes. J. Arthur Swenson, Lacey A. Wagner, and George L. Pigman. J. Research NBS <u>14</u> , 419(1935).
RP782	O.P.	Effect of calcium chloride on portland cements and concretes. Paul Rapp. J. Research NBS <u>14</u> , 499(1935).
RP799	5¢	Behavior of high-early-strength cement concretes and mortars under various temperature and humidity conditions. Louis Schuman and Edward A. Pisapia. J. Research NBS <u>14</u> , 723(1935).
RP839	5¢	A study for the preparation of a specification for high-early-strength portland cement. G. Rupert Gause. J. Research NBS <u>15</u> , 421(1935).
RP884	5¢	Studies of the quaternary system $\text{CaO-MgO-2CaO.SiO}_2\text{-3CaO.3Al}_2\text{O}_3$. H.F. McMurdie and Herbert Insley. J. Research NBS <u>16</u> , 467(1936).

RESEARCH PAPERS (Cont'd.)

<u>Series</u>	<u>Price</u>	
RP887	5¢	Effects of partial prehydration and different curing temperatures on some of the properties of cement and concrete. F.B. Hornibrook, G.L. Kelousek, and C.H. Jumper. J. Research NBS <u>16</u> , 487(1936).
RP891	5¢	A rapid method for the determination of silica in portland cement. Edwin E. Maczkowske. J. Research NBS <u>16</u> , 549(1936).
RP893	5¢	Determination of sulphuric anhydride in portland cement by means of the Wagner turbidimeter. Robert B. Rudy. J. Research NBS <u>16</u> , 555(1936).
RP910	5¢	Distribution of compounds in portland cement. J. Arthur Swenson and E.P. Flint. J. Research NBS <u>17</u> , 261(1936).
RP917	5¢	Structural characteristics of some constituents of portland cement clinker. Herbert Insley. J. Research NBS <u>17</u> , 353(1936).
RP941	5¢	The system lime-boric oxide-silica. E.P. Flint and Lansing S. Wells. J. Research NBS <u>17</u> , 727(1936).
RP968	5¢	Determination of sulphur occurring as sulphide in portland cement. Harry A. Bright. J. Research NBS <u>18</u> , 137(1937).
RP987	5¢	Studies on a portion of the system: $\text{CaO-Al}_2\text{O}_3\text{-Fe}_2\text{O}_3$. Howard F. McMurdie. J. Research NBS <u>18</u> , 475(1937).
RP997	10¢	Method for approximating the glass content of portland cement clinker. William Lerch and Lorrin T. Brownmiller. J. Research NBS <u>18</u> , 609(1937).

CIRCULARS

C70	50¢	Materials for the household (non-technical information on use of cement). Cir. BS, C70 (1917).
C135	O.P.	Caustic magnesia cement. Cir. BS, C135 (1922).
C311	15¢	Stucco investigations at the Bureau of Standards with recommendations for portland cement stucco construction. Cir. BS, C311 (1926).

LETTER CIRCULARS

<u>Series</u>	<u>Price</u>	
LC74	Free on application to Bureau	Standard specifications for sieves. Let. Cir. BS, LC74 (Oct. 1, 1926).

FEDERAL SPECIFICATIONS

The specifications listed below are issued by the Federal Specifications Executive Committee, Procurement Division, Federal Warehouse, Washington, D.C. Copies may be secured from the Superintendent of Documents, Government Printing Office, this city, at the prices indicated.

SS-C-158	10¢	Cements, Hydraulic, General Specifications (Methods for Sampling, Inspection and Testing.)
SS-C-181a	5¢	Cement; Masonry.
SS-C-191a	5¢	Cement; Portland.
SS-C-211	5¢	Cement; Portland, Sulphate-Resisting.
SS-C-201	5¢	Cement; Portland, High-Early-Strength.
SS-C-206	5¢	Cement; Portland, Moderate-Heat-of Hardening.

ARTICLES PUBLISHED IN OUTSIDE JOURNALS

The articles indicated below are listed in chronological order. The name of the journal or of the organization publishing the article is given in abbreviated form, with address in parentheses, together with the volume number (underscored), page, and year of publication in the order named. These publications are not for distribution or sale by the Government, but may be consulted at most large libraries or in some cases may be purchased directly from the publishers.

The effect of high pressure steam on the crushing strength of portland cement mortar and concrete. R.J.Wig. Proc. Am. Soc. Testing Materials (American Society for Testing Materials, 260 South Broad Street, Philadelphia, Pa.), 11, 580(1911); also Tech. Pap. BS, T5, 1, (1910-12).

Present status of iron ore cement. P.H. Bates. J. Nat. Assoc. Cement Users (American Concrete Institute, 7400 Second Blvd., Detroit, Mich.), 566(1912).

Action of the salts in alkali water and sea water on cement. R.J. Wig and P.H. Bates. J. Franklin Inst. (Journal of the Franklin Institute, 20th & Parkway, Philadelphia, Pa.), 175, 65(1913); also Tech. Pap. BS, T12, 2, (1912-14).

The constitution of portland cement. P.H. Bates. J. Nat. Assoc. Cement Users, 368(1913).

Errors in the methods of determining the time of setting of cement. G.H. Williams. Proc. Am. Soc. Testing Materials, 14, Part II, 172(1914).

Time of setting of cement. G.H. Williams. Proc. Am. Soc. Testing Materials, 14, Part II, 200(1914).

Properties of portland cement having a high MgO content. P.H. Bates. Proc. Am. Concrete Inst. (American Concrete Institute, 7400 Second Boulevard, Detroit, Mich.), 10, 470(1914).

Some properties of white portland cement. P.H. Bates. J. Am. Ceram. Soc. (American Ceramic Society, 2525 N. High St., Columbus, Ohio), 16, 551(1914).

Some further results obtained in investigations of the properties of portland cement having a high MgO content. P.H. Bates. Proc. Am. Concrete Inst., 11, (1915).

The effect of fine grinding and a higher SO₃ content upon the physical properties of portland cement. P.H. Bates. Proc. Am. Soc. Testing Materials (American Society for Testing Materials, 260 S. Broad St., Philadelphia, Pa.), 15, Part II, 126(1915).

Process and apparatus for separating and analyzing granular materials. Patent 1,186,525. U.S. Patent Office, Washington, D.C., June 8, 1916. (Price 10 cents).

What is the trouble with concrete in seawater? R.J. Wig and Lewis R. Ferguson. Eng. News-Record - Series of five articles (McGraw-Hill Publishing Co., Inc., 330 W. 42d Street, New York, N.Y.), Sept. 1917.

The hydraulic properties of the calcium aluminates. P.H. Bates. J. Am. Ceram. Soc., 1, p. 679, Oct. 1918.

Cements producing quick hardening concretes. P.H. Bates. Proc. Am. Soc. Testing Materials, 19, Part II, 429(1919).

Specifications for the U.S. Standard sieve series. J.C. Pearson. Proc. Am. Concrete Inst., 16, 49(1920).

Effect of age of test pieces in soundness tests of portland cement. J.R. Dwyer. Concrete - Cement Mill Edition (Concrete Publishing Co., 400 W. Madison St., Chicago, Ill.), 17, p.87, Dec. 1920.

Shrinkage of cement mortars and its importance in stucco construction. J.C. Pearson. Proc. Am. Concrete Inst., 17, 133(1921).

Time of set of concrete. Watson Davis. Proc. Am. Soc. Testing Materials, 21, Part II, 995(1921).

Relation between tensile and compressive strengths of cement mortars. J.R. Dwyer. Concrete - Cement Mill Edition, 18, p. 123, June, 1921.

Plastic magnesia cements. P.H. Bates and Roy M. Young. J. Am. Ceram. Soc., 4, p. 570, July, 1921.

The application of the fundamental knowledge of portland cement to its manufacture and use. P.H. Bates. J. Franklin Inst. (Journal of the Franklin Institute, 20th & Parkway, Philadelphia, Pa.), 193, p. 289, Mar. 1922.

Inspection of portland cement. J.R. Dwyer and R.N. Young. Concrete (Concrete Publishing Co., 400 W. Madison St., Chicago, Ill.), 21, p. 56, Aug. 22; and p. 95, Sept. 1922.

Need of research in the portland cement industry. P.H. Bates. Chem. & Met. Eng. (Chemical and Metallurgical Engineering, McGraw-Hill Publishing Co., 330 W. 42d St., New York, N.Y.), 29, p. 462, Aug. 30, 1922.

What properties and methods of making portland cement need further investigation? P.H. Bates. Proc. Am. Soc. Testing Materials, (American Society for Testing Materials, 260 S. Broad St., Philadelphia, Pa.), 23, Part II, 160(1923).

Late data on fine grinding and additional SO_3 to cements. P.H. Bates. Proc. Am. Soc. Testing Materials, 23, Part II, 248(1923).

Discussion on the "Meaning and microscopic measurement of average particle size." J.C. Pearson. J. Am. Ceram. Soc. (American Ceramic Society, 2525 N. High St., Columbus, Ohio), 6, p. 121, May 1923.

The possibility of improving hydraulic cements. P.H. Bates. Proc. Portland Cement Assoc. (Portland Cement Association, 33 W. Grand Ave., Chicago, Ill.), May 21, 1923.

Discussion of aluminate cement-portland cement. P.H. Bates. Proc. Am. Concrete Inst. (American Concrete Institute, 7400 Second Blvd., Detroit, Mich.), 20, 355(1924).

New process of making high alumina cement. P.H. Bates. Rock Products (Trade Press Publishing Corp., 205 W. Wacker Drive, Chicago, Ill.), May 30, 1925.

Fine grinding of cement increases strength of concrete. Morris Temin and W.H. Sligh. Concrete, 27, p. 47, Sept. 1925.

Portland cement research. R.H. Bogue. Proc. Am. Soc. Testing Materials, 26, Part II, 403(1926).

High alumina hydraulic cements. P.H. Bates. Ind. and Eng. Chem. (Industrial and Engineering Chemistry, Mills Bldg., Washington, D.C.), 18, p. 554, June 1926.

A digest of the literature on the constitution of portland cement clinker. R.H. Bogue. Concrete, July 1926 to Feb. 1927.

Studies on the system $\text{CaO-Fe}_2\text{O}_3\text{-SiO}_2$. W.C. Hansen and R.H. Bogue. J. Am. Chem. Soc. (American Chemical Society, The Ohio State University, Columbus, Ohio), 48, 1261(1926).

The determination of uncombined lime in portland cement. Wm. Lerch and R.H. Bogue. Ind. and Eng. Chem. (Industrial and Engineering Chemistry, Mills Bldg., Washington, D.C.), 18, 739(1926).

Long time tests of high magnesia cements. P.H. Bates. Proc. Am. Soc. Testing Materials (American Society for Testing Materials, 260 South Broad St., Philadelphia, Pa.), 27, Part II, 324(1927).

- Portland cement in concrete engineering. R.H. Bogue. Proc. Am. Concrete Inst. (American Concrete Institute, 7400 Second Blvd., Detroit, Mich.), 23, 355(1927).
- Why time is a factor in the study and use of cement. P.H. Bates. Proc. Am. Concrete Inst., 23, 436(1927).
- The preparation and optical properties of calcium hydroxide crystals. F.W. Ashton and Raymond Wilson. Am. J. Sci. (American Journal of Science, New Haven, Conn.), 13, 209(1927).
- Studies on the system $\text{CaO-Al}_2\text{O}_3\text{-SiO}_2$: The composition $8\text{CaO}+\text{Al}_2\text{O}_3+2\text{SiO}_2$. W.C. Hansen, W. Dyckerhoff, F.W. Ashton, and R.H. Bogue. J. Phys. Chem. (Journal of Physical Chemistry, Williams & Wilkins Co., Baltimore, Md.), 31, 607(1927); Rock Products (Trade Press Publishing Corp., 205 W. Wacker Drive, Chicago, Ill.), 30, Apr. 16, 1927.
- The preparation of optically clear selenium for use in index media. L.T. Brownmiller. Am. Mineral. (American Mineralogical Society of America, U.S. Geological Survey, Washington, D.C.), 12, 43 (1927).
- X-ray diffraction measurements on some of the pure compounds concerned in the study of portland cement. E.A. Harrington. Am. J. Sci., 13, 467(1927).
- The present status of portland cement and the possibilities of super cements. P.H. Bates. Rock Products, 30, 77, Dec. 29, 1927.
- The combination of lime in portland cement compounds. - Preliminary investigation. W.C. Hansen and R.H. Bogue. Ind. and Eng. Chem., 19, 1260(1927).
- Studies on the hydrolysis of compounds which may occur in portland cement. Wm. Lerch and R.H. Bogue. J. Phys. Chem., 31, 1627(1927).
- Cement as a factor in the workability of concrete. P.H. Bates and J.R. Dwyer. Proc. Am. Concrete Inst., 24, 43(1928).
- Notes on the progress of some studies of the crazing of portland cement mortars. P.H. Bates and C.H. Jumper. Proc. Am. Concrete Inst., 24, 179(1928).
- Limes, structural cements and plasters. P.H. Bates and J.M. Porter. Survey Am. Chem. (Survey of American Chemistry, National Research Council, Washington, D.C.), Third Annual, (1928).
- Further studies on portland cement compounds by the X-ray diffraction method. W.C. Hansen. J. Am. Ceram. Soc. (American Ceramic Society, 2525 N. High St., Columbus, Ohio), 11, 68, Feb. 1928.

A digest of the literature on the nature of the setting and hardening processes of portland cement. R.H. Bogue. Rock Products (Trade Press Publishing Corp., 205 W. Wacker Drive, Chicago, Ill.), May to Sept. 1928.

Modern cements - A study of the characteristics of the hydraulic cements of today. P.H. Bates. Eng. News-Record (Engineering News-Record, McGraw-Hill Publishing Co., 330 W. 42d St., New York, N.Y.), 100, 887, June 7, 1928; 932, June 14, 1928.

Studies on the system calcium oxide-alumina-ferric oxide. W.C. Hansen, L.T. Brownmiller and R.H. Bogue. J. Am. Chem. Soc. (American Chemical Society, The Ohio State University, Columbus, Ohio), 50, 396(1928).

Equilibrium studies on alumina and ferric oxide combinations of these with magnesia and calcium oxide. W.C. Hansen and L.T. Brownmiller. Am. J. Sci. (American Journal of Science, New Haven, Conn.), 15, 225(1928).

Phase equilibria in the system $2\text{CaO}.\text{SiO}_2.\text{MgO}-5\text{CaO}.\text{3Al}_2\text{O}_3$. W.C. Hansen. J. Am. Chem. Soc., 50, 3081(1928).

The cause of unsoundness in portland cement. Wm. Lerch. Concrete - Cement Mill Edition (Concrete Publishing Co., 400 W. Madison St., Chicago, Ill.), 35, 109, July 1929; 115, Aug. 1929.

Calculation of compounds in portland cement. R.H. Bogue. Ind. and Eng. Chem. (Anal. Edition) - (Industrial and Engineering Chemistry. Mills Bldg., Washington, D.C.), 1, 192, Oct. 1929.

High strength, high early strength and waterproof concrete. P.H. Bates. Engrs. and Eng. (Engineers and Engineering - Ceased publication with vol. 49, Mar. 1932), 46, 177, July, 1929.

Variations in standard portland cements. P.H. Bates. Proc. Am. Concrete Inst. (American Concrete Institute, 7400 Second Blvd., Detroit, Mich.), 26, 65(1930).

The relation between the strengths of cements developed by mortar specimens and concrete specimens. J.R. Dwyer and P.H. Bates. Proc. Am. Soc. Testing Materials (American Society for Testing Materials, 260 S. Broad St., Philadelphia, Pa.), 30, Part II, 598(1930).

Some properties of high alumina cement from six countries. P.H. Bates. Proc. New Intern. Assoc. Testing Materials (New International Association for Testing Materials, Leonhardstrasse 27, Zurich, Switzerland), Group B, 210(1930).

Revised procedure for the determination of uncombined lime in portland cement. Wm. Lerch and R.H. Bogue. Ind. and Eng. Chem. (Anal. Edition) - (Industrial and Engineering Chemistry, Mills Bldg., Washington, D.C.), 2, 296, July 15, 1930.

The X-ray method applied to a study of the constitution of portland cement. L.T. Brownmiller and R.H. Bogue. Am. J. Sci. (American Journal of Science, New Haven, Conn.), 20, 241(1930); also BS J. Research 5, 813(1930), RP233.

Suggested investigations of high alumina cements. P.H. Bates. Proc. New Intern. Assoc. Testing Materials, (1931).

Cement and concrete (Chapter XXVIII, Annual Survey of American Chemistry, 1930). John Tucker, jr. Annual Survey Am. Chem. (National Research Council, Washington, D.C.), May 1931.

Can cement durability be predicted? E.T. Carlson and P.H. Bates. Eng. News-Record (Engineering News-Record, McGraw-Hill Publishing Co., 330 W. 42d St., New York, N.Y.), 107, 130, July 23, 1931.

The decomposition of tricalcium silicate in the temperature range 1000°-1300°C. E.T. Carlson. Rock Products (Trade Press Publishing Corp., 205 W. Wacker Drive, Chicago, Ill.), XXXIV, 52, Dec. 5, 1931; also BS J. Research 7, 893(1931), RP381.

Natural cement mortar found strong after half a century. P.H. Bates. Eng. News-Record, 108, 96, Jan. 21, 1932.

Notes on hardening cements at the boiling point of water. P.H. Bates and R.L. Blaine. Proc. Am. Concrete Inst. (American Concrete Institute, 7400 Second Blvd., Detroit, Mich.), 28, 531(1932).

The system $\text{CaO-Na}_2\text{O-Al}_2\text{O}_3$. L.T. Brownmiller and R.H. Bogue. Am. J. Sci. (American Journal of Science, New Haven, Conn.), 23, 501 (1932); also BS J. Research 8, 289(1932), RP414.

The chemical analyses of the particles of various sizes of ground cement. E.T. Carlson and P.H. Bates. Rock Products, XXXV, 18, Oct. 22, 1932.

The hydration of tricalcium aluminate. W.D. Foster. Proc. Am. Concrete Inst., 29, 189(1932).

Status of specifications for hydraulic cements in the United States. P.H. Bates. Proc. Am. Soc. Testing Materials (260 S. Broad St., Philadelphia, Pa.), 33, Part II, 462(1933).

A rapid method for determination of the specific surface of portland cement. L.A. Wagner. Proc. Am. Soc. Testing Materials (260 S. Broad St., Philadelphia, Pa.), 33, Part II, 553(1933).

Present day cement and cement of 20 years ago. P.H. Bates. Eng. News-Record (McGraw-Hill Publishing Co., 330 W. 42d St., New York, N.Y.), 110, 492(1933).

A compilation of phase-rule diagrams of interest to the ceramist and silicate technologist. F.P. Hall and Herbert Insley. J. Am. Ceram. Soc. (American Ceramic Society, 2525 N. High St., Columbus, Ohio), 16, 483(1933).

Progress report on the reaction of calcium chloride on portland cement. L.S. Wells and Paul Rapp. Proc. Highway Research Board (National Research Council, Washington, D.C.) Thirteenth Annual Meeting, 291, Dec. 1933.

The heat of hydration of portland cement pastes. Wm. Lerch and R.H. Bogue. Concrete - Cement Mill Section (Concrete Publishing Co., 400 W. Madison St., Chicago, Ill.), 42, 36(1934); 39(1934); also J. Research NBS 12, 645(1934), RP684.

A simple apparatus for determining heat of hydration of portland cement. Wm. Lerch. Eng. News-Record, 113, 523(1934).

Hydration of portland cement compounds. R.H. Bogue and Wm. Lerch. Ind. and Eng. Chem. (Industrial and Engineering Chemistry. Mills Bldg., Washington, D.C.), 26, 837(1934).

Influence of composition on volume constancy and salt resistance of portland cement pastes. R.H. Bogue, Wm. Lerch, and W.C. Taylor. Ind. and Eng. Chem., 26, 1049(1934).

Effect of calcium chloride on portland cements and concretes. Paul Rapp. Proc. Highway Research Board, Fourteenth Annual Meeting, Dec. 1934.

Trends in the production and use of various types of hydraulic cements. P.H. Bates. Proc. Am. Concrete Inst. (American Concrete Institute, 7400 Second Blvd., Detroit, Mich.) 31, 225(1935).

Compounds in portland cement revealed by high-temperature research upon cement components. R.H. Bogue. Ind. & Eng. Chem., 27, 1312(1935).

A study of the system Lime-Potash-Alumina. L.T. Brownmiller. Am. J. Sci. (American Journal of Science, New Haven, Conn.), 29, 260(1935).

Determination of specific surface of portland cement raw mixtures by means of Wagner turbidimeter. T. Asano. Rock Products (Trade Press Publishing Corp., 205 W. Wacker Drive, Chicago, Ill.), 39, Feb. 1936.

The use of blast furnace slags in the manufacture of hydraulic cements. P.H.Bates. Proc. Nat. Slag Assoc.(National Slag Association, Earle Bldg., Washington, D.C.), 1936.

Effect of departure from planeness of bearing surfaces on the compressive strength of 2-in. mortar cubes. J.R. Dwyer. Proc. Am. Soc. Testing Materials (American Society for Testing Materials, 260 South Broad Street, Philadelphia, Pa.), 36, Part II, 351(1936).